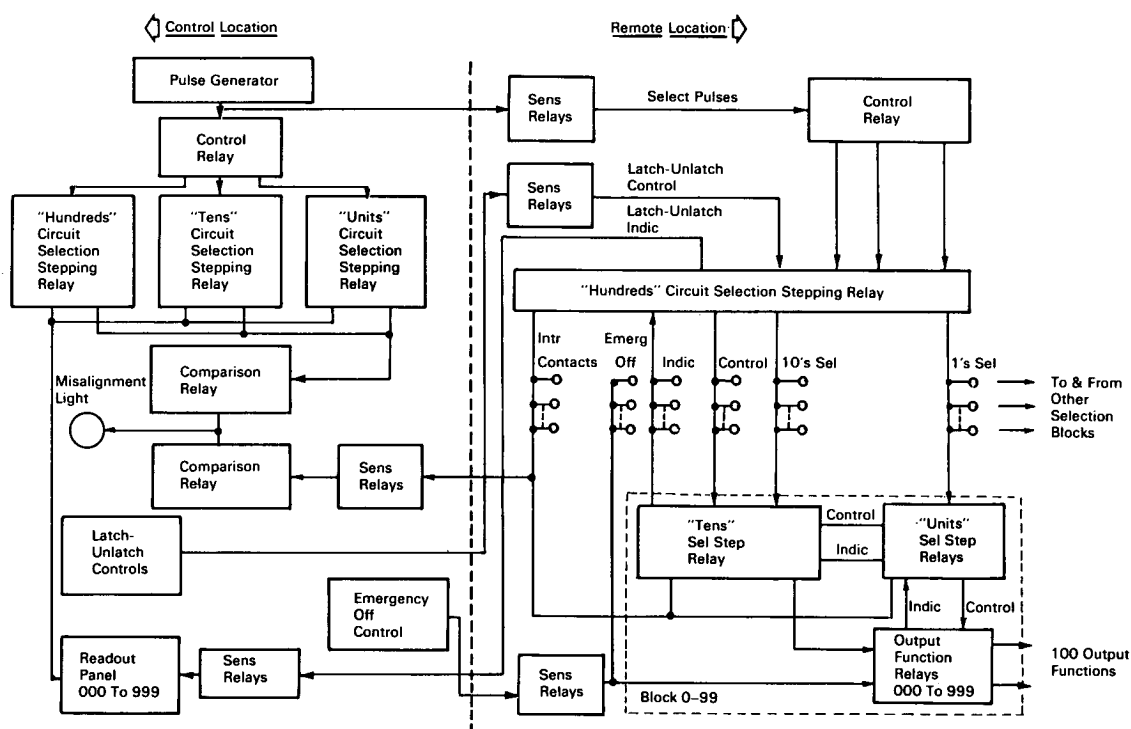


# NASA TECH BRIEF



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## Remote Control Electrical Switching System Has 1000-Output Capability



BLOCK DIAGRAM FOR 100 OUTPUT

**The problem:** To design a versatile remote control system using a minimum of interconnections between the control location and the remote location to reduce installation and maintenance costs.

**The solution:** An electromechanical remote control command system with a capacity of 1000 individual on-off functions, using only seven pairs of telephone-type lines for interconnection. The system provides either momentary operation or selective latching and unlatching operation of any of 1000 possible output

function relays. Automatic verification circuits provide a positive indication of the output status to ensure error-free operation.

**How it's done:** A transistorized flip-flop pulse generator and stepping relay combination at the control location provides the control signals for the system. The generator is controlled by ten pushbuttons and supplies pulses required to activate the circuit selection stepping relays. Sensitive relays at the remote location receive these pulses. Pulses are fed through

(continued overleaf)

control relays, at both locations, to the circuit selection relays. The control relays step once for each group of pulses and feed pulses first to the "hundreds" relays, then to the "tens" relays, and finally to the "units" relays. The fourth position of the control relay automatically resets the selection relays to their zero position. At the remote location, the "hundreds" relay selects one of the ten possible blocks of 100 output relays. The "tens" and "units" relays then act in a cross-bar manner to select the particular output relay in the selected block. An indicator light at the remote location is provided for each output function.

As the selection operation occurs, two comparison stepping relays at the control location are activated to verify correct selection relay operation. If the control location does not agree with the remote location, a light at the control location indicates the misalignment. An operator can then reset all of the output relays by means of pushbuttons in the emergency off control. A readout panel at the control location indicates the status (latched or unlatched) of all the output relays.

**Notes:**

1. The block diagram shows the functional elements for 100 output relays. The capacity of the system can be increased, in increments of 100, to the full capacity of 1000 output functions.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama, 35812  
Reference: B65-10318

**Patent status:** NASA encourages the immediate commercial use of this invention. It is owned by NASA and inquiries about obtaining royalty-free rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

Source: International Business Machines under contract to Marshall Space Flight Center (M-FS-380)